JPRS L/8743

31 October 1979

East Europe Report

SCIENTIFIC AFFAIRS

(FOUO 7/79)

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APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000200010012-5

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CZECHOSLOVAKIA

NEW CONSOLIDATED COMPUTER PRODUCTION ORGANIZATION DISPLAYS PRODUCTS

Prague TECHNICKY TYDENNIK in Czech No 36, 1979 p 6

[Text] Beginning this year, the federal Ministry of General Engineering contains a new economic production unit, the Automation and Data Processing Equipment Plants (ZAVT). All ZPA [Instrument and Automation Plant] organizations have been consolidated with Zbrojovka Brno and several Tesla enterprises engaged in developing and producing data processing equipment.

Among the most important tasks of the new unit are not only the development, production and sales of digital, analog and control computers, including peripherals and equipment for preprocessing, processing, collection, transmission and output of data, but also the production of instruments for automatic regulation and control, electrical and mechanical measuring instruments, control systems for industrial processes, scientific and laboratory instruments and timing equipment. All of these tasks are performed by 13 production enterprises: ZPA Kosire, ZPA Jinonice, ZPA Dukla Presov, ZPA Cakovice, Metra Blansko, Aritma, Laboratorni pristroje, ZPA Vinohrady, ZPA Pragotron, ZPA Novy Bor, ZPA Trutnov, the Data Processing Equipment Plants [Zavody vypoctove techniky], and Zbrojovka Brno. The last-named enterprise also produces office equipment, motors for wheeled and caterpillar tractors, and hunting and sports firearms.

The research and development base for the major production divisions is provided by the Research Institute of Automation Equipment, the Research Institute of Mathematical Machinery, the Research Institute of Data Processing Equipment and the Institute of Data Processing Applications.

Three specialized organizations provide major engineering, applications, consultation, planning, installation and service functions for the equpment they supply: the ZPA Supply Enterprise [dodavatelsky podnik] for measuring, control and automation equipment, and Kancelarske stroje [office equipment] and Datasystem for data processing and office equipment.

The Automation and Data Processing Equipment Plants are participating in this year's International Machinery Fair in Brno as the indirect provider of 160 exhibits, of which half constitute innovations. Measuring equipment from

Metra Blansko and ZPA Dukla Presov, control equipment from ZPA Jinonice, ZPA Kosire, ZPA Vinohrady, ZPA Dukla Presov, ZPA Novy Bor and ZPA Trutnov, and electronics from the Data Processing Equipment Plants will be on display in the exhibits of the Kovo enterprise in Pavilion C, Gallery 2.

Kovo will also present data processing equipment from Aritma, Zbrojovka Brno, ZPA Kosire, ZPA Cakovice, ZPA Trutnov, the Data Processing Equipment Plants, ZPA Novy Bor and ZPA Dukla Presov on the first floor of Pavilion D, along with laboratory equipment from Laboratorni pristroje, which will be in Gallery 1 of Pavilion Z.

The Merkuria exhibit in Gallery 2 of Pavilion C will display timing and information equipment from ZPA Pragotron.

The General Management Office of the Automation and Data Processing Equipment Plants [ZAVT] will be located in Galleries 1 and 2 of Pavilion C and that of Kancelarske stroje in the open area of Pavilion D. Datasystem and the Institute of Data Processing Applications will have their booth in the open area of Pavilion C, while the booths of ZPA Cakovice and ZPA Supply Enterprise will be in open area M.

ZAVT has entered seven of its top exhibits in the competition for a gold medal:

the EC 5075 [=ES 5075 of Unified System] floppy-disk I/O unit (produced by Aritma and on display on the first floor of Pavilion D);

the Consul 2711 two-place floppy-disk data preparation station (EC 9111, produced by Zbrojovka Brno and on display on the first floor of Pavilion D);

the PAS 22 set of polarographic instruments (produced by Laboratorni pristroje and on display in Gallery 1, Pavilion Z);

a distance-measurement complex with automatic data interpretation (produced by Metra Blansko, on display in Gallery 2, Pavilion C);

the LZ 1002 He-Ne production laser (produced by Metra Blansko, on display in Gallery 2, pavilion C);

the basic configuration of the SM 3-20 computer system (produced by the Data Processing Equipment Plants, on display on first floor, Pavilion D);

the EC 7934 serial printer (produced by the Data Processing Equipment Plants, on display on first floor, Pavilion D).

The Input/Output Unit

This is the main peripheral for the 3.5th generation Unified System [EC] electronic computers. It is designed for direct transfer of data between a floppy disk and the computer. Performing a similar function to punched-card equipment,

it completely replaces card readers and punches. The main components of this unit are a disk changer, the disk module (EC 5074) and the control unit, together with buffer memory and a channel unit.

The automatic floppy disk changer can change up to 20 disks without operator intervention. The data medium is a standard floppy disk, on which information is recorded in 77 concentric tracks, each track divided into 26 sectors holding one block of fixed length. Each block has space for 128 bits of data. The capacity of each track is 3,328 bits and the capacity of the entire disk 242,944 bits, with two unoccupied spare tracks. The capacity of the disk is equivalent to that of 1,900 punched cards. Recording is done by a single read-write head by the contact method. The recording and reading take place in the mechanical part of the EC 5074 memory unit.

The EC 5075 floppy-disk I/O unit provides high-speed data output and input, considerable equipment flexibility (it may operate as both an input and output unit or as two independent input or output units, and if necessary one changer may work with the computer while independent testing is carried out on the other), excellent reliability and decreased operating expenses.

Some figures: the capacity of the diskette is 242,944 bits, the number of tracks per diskette is 77, the transmission speed is 250,000 bits per second, the reading speed 3,600 blocks per minute for each EC 5074 memory, and the recording speed 2,200 blocks per minute for each memory unit.

Data Preparation on Floppy Disk

The data preparation station is part of the Consul 2711 system, intended for preparation, preprocessing and transmission of data, and is used for centralized or decentralized data collection in departments preparing data for computers. It is a top-quality computer product of modular design (containing three independent modules: two keyboards and one electronic module) based on current microprocessor technology. It replaces the corresponding punched-card equipment, i.e. card punches, verifiers and tabolators. It is a device which embodies the generational transition from paper data media such as punched cards and paper tape to magnetic media, i.e. floppy disks. For comparison we may note that a floppy disk weighing 20 grams replaces a carton of 2,000 cards. In addition to a considerable decrease in noise, which is an important aspect of improving working conditions, the Consul 2711 two-place data preparation station has other excellent technical, economic and operating qualities.

The station has two independent places for operators. Each operator has his own keyboard, his own display and his own floppy-disk memory unit. The other parts, particularly the control electronics (an 8-bit microprogrammed processor with RAM and ROM) and the power supply (a pulse power supply which offers a considerable advance in energy efficiency) are shared.

The PAS-2 Polarographic Instrument Set

This set includes:

the PA-2 polarographic analyzer: this is the basic electronic instrument, intended primarily for classical DC polarography with a 2- or 3-electrode system, [tast] polarography, differential pulse polarography, cyclic voltametry and differential pulse dissolvent voltametry with semiautomatic operation;

the 4103 plane XY coordinate plotter: although this is intended primarily for operation with the polarographic analyzer, it may also be used independently, for example with analog hybrid computer equipment, in research, development, experimental and measurement laboratories and the like;

the SEP polarographic electrode system: this is intended for use with the polarographic analyzer and consists of a set of electrochemical cells with electrodes and supports;

the RDE rotating disk electrode for use with the PA-2 polarographic analyzer: the RDE has an automatic time program and is intended for use in the inverse voltametry method, which is the most sensitive method of determining traces of heavy metal pollution in the environment.

Distance Measurement with Automatic Data Interpretation

The main system consists of a data connection between the LA 311 processing electronics of the LA 3002 laser unit and the M3T 300 intelligent terminal. The measurement data from the LA 3002 distance measurement device are automatically fed to the memory of the terminal and processed in accordance with the measuring problem in question. The user programs are written in BASIC.

The unit provides high-accuracy measurement by the laser, using the interference method. Other advantages are the possibility of monitoring and automatic alteration of the measuring conditions, immediate processing of the measurement data, complete automation of operation, and conversational interaction with the attendant.

The unit can be used effectively in all cases where high accuracy is required in measurement of a large number of distances entailing toilsome processing of the measurement data. The unit is of particular importance in monitoring positioning systems of numerically controlled machine tools, where measurement and analysis are completely automated; when the highest-precision measurement is used, it outputs the processing results in the form of a printed report as much as 100 times as fast as traditional methods.

The LA 1002 He-Ne Production Laser

The LA 1002 helium-neon laser has a broad range of applications in science and industry (for holography, Raman spectrography, laser projection, data processing and transmission and the like). It has a high output, excellent stability and long life.

The laser consists of the head and the power supply unit, which are connected by a special high voltage cable. The most important part is the laser head, consisting of a thick-walled quartz tube which assures temperature stability of the dimensions and serves as the resonator. The laser head comprises the helium-neon discharge tube with dielectric mirrors which serve to form the optical resonator cavity.

Another part of the helium-neon laser is the power supply electronics, which feeds power to the discharge tube. It consists of a high voltage source and circuitry rpoviding electronic stabilization.

The Basic Configuration of the SM 3-20 Computer System

This is the basic part of the disk-oriented 3.5th generation computer system, intended for general use in various branches of the national economy, for example in scientific-technical, economic and statistical calculations, for the control of laboratory measurements, scientific experiments and the like.

The basic configuration of the SM 3-20 computer systems consists of:

a processor with a start module, a simple clock and semicondustor internal memory;

a disk drive for disk packs and its control unit;

an alphanumeric display with keyboard;

a paper tape reader and punch with control unit;

a matrix printer and keyboard.

All of this equipment is included in the System of Small Electronic Computers (SMET).

The basis of this system is the SM 3-20 computer, which is connected into the complex as a subsystem via a common bus. This processor (the result of cooperation between the Soviet Research Institute of Electronic Control Computers in Moscow and the Czechoslovak Institute of Data Processing Equipment in Zilina) performs a control function and allocates the common bus to the other devices, performs arithmetic and logical operations and decodes instructions. It can transfer data directly between input and output devices and memory. It uses one- or two-operand instructions and operates with a 16-bit word or an 8-bit syllable [byte]. Communication between the processor and the other devices is unified for the entire system. Each device connected to the common bus counts as an addressable memory location and has a specific address. By means of these addesses all the devices can communicate among themselves in a unified fashion. The processor, as the dominant unit connected to the common bus, includes a control module (which controls allocation of the common bus to the individual devices according to their priority levels).

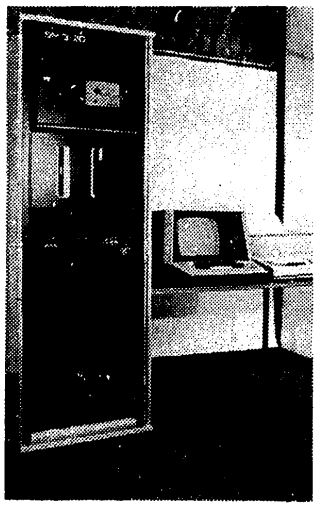
An important feature of the basic configuration of the SM 3-20 computer system is the possibility of connecting local or remote terminals and thus creating terminal and computer networks.

The EC 7934-00 Printers, Models 1 and 2

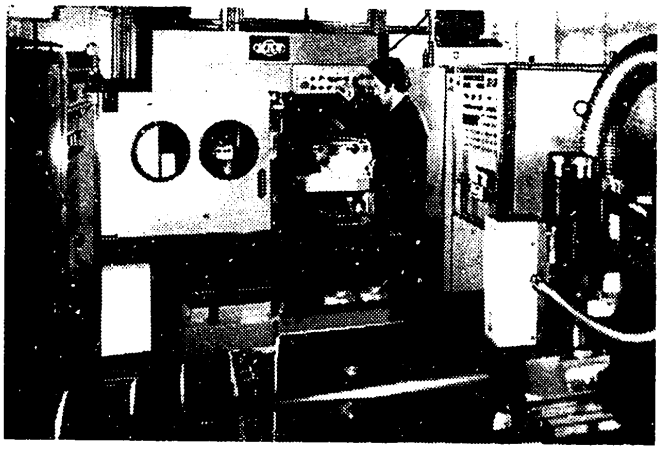
Both types of printer are designed for the EC 7920 display system and are used to produce printed copies of the information displayed on the screen or to be printed out by a program. The memory capacity of the Model 1 is 480 characters and that of the Model 2 1,920 characters.

In the EC 7920 system, the printers may be used in the EC 7922-00 local group subsystem or in the EC 7921-10 remote group subsystem.

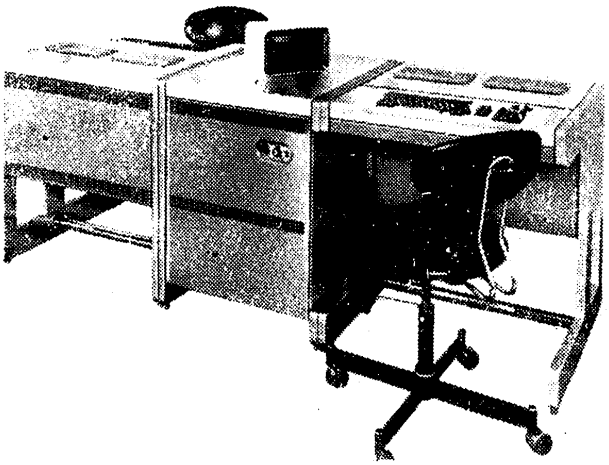
The EC 7934 serial printer, with a speed of 150 characters per second, can print on individual sheets, or on roll paper or edge-perforated paper.



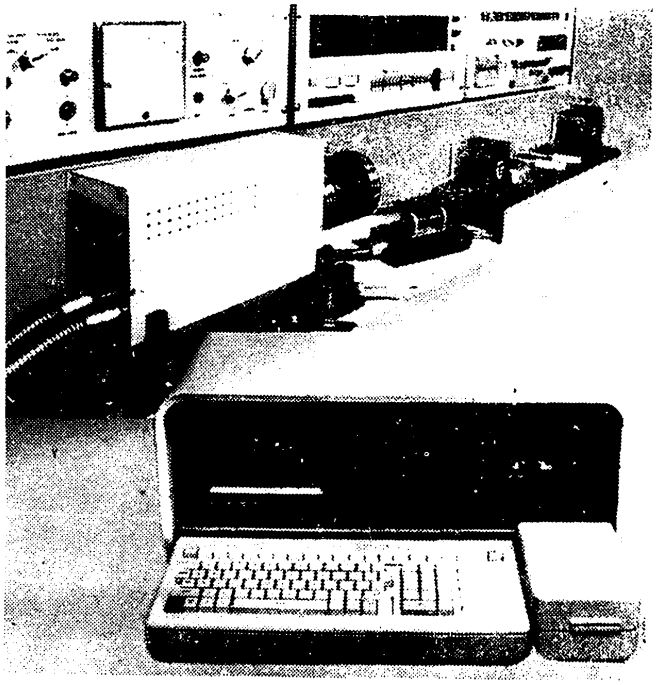
The basic configuration of the SM 3-20 computer system.



The Industrial Automation Plants [Zavody prumyskove automatizace] in Nove Bor have an SPT-16 N semiautomatic lathe with a Dapos S3G control system in operation. The operator is Mario Dierze.



The Consul 2711 floppy-disk two-place data preparation station [EC 9111].



The distance measurement device with automatic data interpretation.

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CSO: 2402

CZECHOSLOVAKIA

MARS, VARS SYSTEMS, COMPUTER UTILIZATION DISCUSSED

Prague PODNIKOVA ORGANIZACE in Czech No 7, 1979 pp 330-333

[Article by Engr Jiri Sedlacek: "MARS and VARS Systems for EC 1021 and 1025 Computers; JSEP and SMEP Devices and Their Utilization"]

[Text] Introduction

A characteristic feature of modern computers is their applied programming capabilities. Among consumers this is considered extremely important, because in practice it considerably speeds up the utilization of expensive computer technology. Consequently, within the framework of the program of applied cybernetics in the CSSR it was decided that CS [Czechoslovak] models of the JSEP-1 and JSEP-2 series (that is, EC 1021 and EC 1025 computers) be provided from the very first deliveries to users with the capability for extensive programming in order to facilitate their efficient utilization. Thus originated the MARS system to which the VARS system will be linked in the very near future.

1. MARS System Characteristics

Consistent with the above facts the MARS system was developed as an ASRP (Automated System of Enterprise Management) prototype with initial coordination with the Cs EC 1021 computer which works under the disc operating system MOS/EC 1021. Further developments made it possible to have the MARS used also with several other JSEP-1 series computers. A part of theprogram resources for the MARS ASRP prototype (involving roughly the scope of the first stage of production) was thus adapted to the operational system DOS/EC (1.3 version). Under these conditions the MARS can therefore also be applied to the EC 1030 computer (or also the EC 1040).

The MARS system was initially intended for small to medium size engineering enterprises. Subsequent to its practical application, however, its great advantages were demonstrated in a number of enterprises and organizations which included various branches even outside the engineering field.

The creation of the MARS system was based on certain fundamental requirements which had to include in particular:

--Standardized design,
--Staged production procedure,
--Modular concept,
--Compatibility with ASRP key subsystems,
--Orientation toward the ASRP breakdown as applied in engineering departments,
--Offering the possibility of further development.

The results of the MARS ASRP prototype design confirm that these conditions were fully observed by the individual designing staffs.

In view of the importance which attached to accelerating the tempo of production of the ASRP in the CSSR the MARS system, as the ASRP prototype, was processed as a state objective under the plan of development of science and technology. The first stage of its production was completed in the period ending 31 December 1975 and in December of that year the results of its conception were subjected to international tests under routine operational conditions in selected organizations. In view of the successful results the MARS ASRP prototype was then recommended, within the scope of the first stage design, for inclusion in the international fund of JSEP computer programs. The ensuing second and final stage was likewise completed in theperiod ending 31 December 1978 through completed projections of prescribed state objectives.

The successful design also incorporated the necessary conditions for further development of the prototype of applied program capabilities which at present will be further oriented toward functionally higher computers of the JSEP-2 series. At the same time, though, retroactive application of new modern components is also expected for the MARS system which will make its updating possible. In this regard, therefore, section 4 (structure of the VARS system) is very instructive since future prospects can be inferred from it. Thus it also contains the basic characteristics of the individual subsystems whose purposes are identical with the MARS ASRP prototype.

2. Final Shape of the MARS ASRP Prototype

This involves the resulting design of the second stage which as of 31 December 1978 made it possible to complete all nine subsystems of the MARS ASRP prototype in the presecribed structure.

The attached diagram shows the concepts and at the same time indicates its orientation to the VARS system. Attached to the diagram are the meanings of the abbreviations used. To these nine subsystems can be added in effect a tenth subsystem which is oriented to the computer center area.

The structure of the individual subsystems was adapted as specifically as possible to the breakdown which is based on the model ASRP worked out by the INORGA institution. This breakdown was adopted in principle also by both of the engineering ministries, that is, the Federal Ministry of Metallurgy and Heavy Engineering and the Federal Ministry of General Engineering. At this point it suffices for better orientation to list at least the groups of tasks which constitute the content of the subsystems mentioned.

2.1 TPV - Technical Preparation of Production

This is divided into these groups of tasks:

--Construction preparation of production,
--Technological preparation of production.

2.2 ORV - Operational Management of Production

This includes according to breakdown of groups of tasks:

--Operational planning of production,
--Time planning for shops,
--Operational production records,
--Computation of budgeted calculations of production.

2.3 MTZ - Material-Technical Procurement

This includes these tasks:

--Assemblages,
--Analysis and standardization,
--Purchasing management,
--Materials records,
--Accounting.

2.4 PAM - Labor and Wages

This sybsystem includes this group of tasks:

--Workers' records and related processing,
--Work evaluation and workers' remuneration.

2.5 NAR - Tool Management

This is divided into these groups of tasks:

--Technical preparation of tool production,
--Operational planning of tool production,
--Operational records of tool production,
--Record of tools in issuing room and in use,
--Technical-economic analysis of tool management.

2.6 ODB - Marketing

This subsystem includes the following groups of tasks:

--Marketing planning,
--Management of order fulfillment,
--Operational balancing of sales,
--Statistics and Accounting,
--Shipping,
--Sales stocks,
--Invoicing,
--Data base.

2.7 UCT - Accounting

This contains these groups of tasks:

--Analytical records of accounts receivable,
--Supplies en route,
--Ledger account,
--Post-calculation.

2.8 ZAP - Fixed Assets

Currently includes this group of tasks:

--Record of fixed assets and materials of gradual consumption and related processing.

2.9 TEP - Technical-Economic Planning

This subsystem includes these groups of tasks:

--Annual and quarterly TEP,
--TEP indicators.

2.10 RVS - Computer Center Management

This subsystem is broken down into these groups of tasks:

--Operation of computer center,
--Analysis, projection and programming,
--Technological care,
--Economic activity of the computer center,
--Data management,
--Compilation and maintenance of subsystem data banks.

2.11 Auxiliary Setup for the MARS ASRP Prototype

An extensibe auxiliary setup is needed for effective support of the MARS system with particular emphasis on these items:

--Comprehensive documentation prepared according to methodic directions for constructing the ASRP which, in addition to operating designs for the individual sybsystems also calls for an operator's manual;

--A training system which is suitably oriented according to the functional objectives of the participants in the courses of instruction for the MARS system;

--Directions and programs for utilization of the diagrammatic chart technology with primary objectives toward applying the MARS ASRP prototype to specific consumer conditions (again this refers to prototype project solutions);

--Consulting assistance to users when individual subsystems are introduced which is provided directly by workers of the individual design staffs;

--Updating and complaint service which provides continuous information to users about the current status of programs and also facilitates the handling of any complaints about deficiencies ascertained in the application of program capabilities.

All the programs which make up the individual sybsystems of the MARS ASRP prototype (in the division into groups of tasks, tasks and associated resources) were subjected to rigorous testing with extensive collections of routine data of selected users before they were released to the consumer market. Meanwhile, at the end of 1978, program capabilities and documentation for the MARS system had already been submitted to

- 252 enterprises and organizations in the MOS/EC 1021 version,

- 84 enterprises and organizations in the DOS/EC version which are preparing to apply it gradually by individual subsystems.

All of the above facts attest to the extraordinary societywide contributions which made possible the successful completion of the design for the MARS ASRP prototype.

3. VARS System Characteristics

In view of further developments of JSEP technical resources and the beginning of production of the JSEP-2 computers, in particular the Czechoslovak EC 1025 computer, preparatory work for development of applied program capability for this computer was started even in the course of 1978. This new system was designated VARS - Multiple Level Automated Management System - which is especially designed for the DOS-3/EC operational system with computers of the JSEP-2 series. This means that it can

be used not only with the EC 1025 computer, which will work under this operational system, but also with other JSEP-2 computers with which the DOS-3/EC can also be used.

In producing the applied program capability for the JSEP-2 series the situation was from the very start a great deal more favorable than was the case when work began on the MARS ASRP rpototype for the EC 1021. That is to say, they were able to proceed on the basis of the concrete experiences gained while creating, testing and gradually even while routinely utilizing the MARS system. This information, consequently, will be fully utilized and the existing design will be further elaborated, expanded and improved.

The VARS system will bring to the concept of building ASRs [Automated Management Systems] a number of new important elements which include, in particular:

- Gradual elaboration of the links between ASRP and ASRSC (Automated System of Middle-Level Management), that is, extension of the horizontal aspect (dividion of ASRP into individual subsystems) to the vertical aspect (connection between ASRP and ASRSC);

- Utilization of the DBS/25 / DL/1 data bank system which was developed for use with the EC 1025 computer (see also reference in point 4.11 below);

- Utilization of all higher functional capabilities and characteristics of series JSEP-2 computers in construction of ASRs;

-Gradual expansion of the number of sybsystems included in the framework of the MARS ASRP prototype in accordance with the official breakdown of engineering departments.

4. Expected Structure of the VARS System

It is understandable that the designing of the VARS system would also make full use of the staged approach as it fully proved itself in production of the MARS ASRP prototype. In addition, there is a definite advantage to have the chief designing capacities represented by those designing staffs which provided the design of the MARS system.

As the attached diagram shows, the contents of the VARS system will represent, even in its initial stage, all the basic subsystems which were completed in the course of the second stage of development of the MARS system (that is, the status as of 31 December 1978). At the same time it also gives an idea of future prospects for construction of the VARS system in the second stage. It is expected that the individual sybsystems will consist of the following, represented by individual groups of tasks:

4.1 Technical Preparation of Production (TPV)

The TPV subsystem again represents one of the key areas of ASRP. Consequently, it takes up comprehensive problems in the sphere of main production under these groups of tasks:

- TPV planning,
- Construction preparation of production,
- Technological preparation of production,
- Production norms and technical-economic norms;
- Changing operations;
- Creation of data base.

The first stage will take care of the main tasks in the area of construction and technological preparation of production, production and technical-economic norms with the necessary linkage with the data base and changing operations. The ORV subsystem particularly makes full use for its needs of the basic collections of the TPV sybsystem.

4.2 Operational Management of Main Production (ORV)

In the area of main production the ORV subsystem is linked organically to the preceding TPV system in the field of planning and insuring main production. For these reasons the following groups of tasks are expected to be treated:

- Annual and quarterly planning of production,
- Capacity assessment,
- Computation of material resources,
- Specific operational planning of production,
- Shop management of production,
- Operational records of production.

Again, the first stage involves particularly the resolution of key tasks in the given areas. A more thorough elaboration of shop production management can be expected only in the second stage.

4.3 Supply Management (MTZ)

This subsystem handles the comprehensive problems of material-technical supplying, that is, in effect insuring theproduction process of necessary materials while observing the principles of economy. The following groups of tasks should help meet all these requirements:

- MTZ planning,
- Classification of supplies,
- Management of purchases,
- Record of the status and movement of material supplies,
- Accounting and analysis.

Within the first stage the focus of work is centered primarily on records of the status and movement of material supplies, then gradually the whole subsystem will be brought up to a level permitting actual management of supplying. This status will be attained to its full extent during the second stage of production of this subsystem.

4.4 Workers (PAM)

Contrary to the MARS system this subsystem will encompass both the areas which under the breakdown of engineering departments are considered as two subsystems, namely, "Management of Cadre and Personnel Affairs" and "Management of Work and Wages." This fact of itself shows the unusual breadth of the scope of this subsystem. It comprehensively covers the problem complex of workers with respect to cadres, personnel, wages and social policies. The whole subsystem represents these groups of tasks:

- Records of workers and related processing,
- Variations in and provision of manpower,
- Changes in workers' social security,
- Changes in level of classification of workers,
- Fluctuation and disposition of cadres,
- Regulation of wage developments,
- Evaluation of work and remuneration of workers.

In the first stage the most important tasks of the individually listed areas will be handled with provision for priority coverage of all output reports taken care of under the MARS ASRP prototype. Consolidating both of the above subsystems into a single one under the designation "Workers" appears advantageous and would make it possible to avoid some duplication which would otherwise be inevitable.

4.5 Tool Management (NAR)

Contrary to the TPV and ORV subsystems, this one is geared to the area of auxiliary production. In its final form these groups of tasks will be included:

- Planning of tool management,
- Technical preparation of piece production,
- Operational planning of production,
- Operational records of production,
- Records of tools in issuing rooms and in use,
- Technical-economic analysis of tool management.

In the first stage of development of this subsystem again the main output reports for the individual groups of tasks will be provided. In this connection the technical-economic analysis of tool management is planned for the second stage.

4.6 Marketing (ODB)

This subsection is designed to handle the problem complex of enterprise marketing operations. Within the enterprise it concerns the execution of the operational plan of the enterprise with all its associated activities while in the enterprise at large it thus makes certain that market demands of a socialist economy are met.

Within the framework of the standard breakdown this subsystem embraces these groups of tasks:

- Marketing planning,
- Management of order fulfillment,
- Sales stocks,
- Shipping,
- Invoicing,
- Statistics and accounting.

The most important tasks of all the first five groups of tasks are included for treatment in the first stage. The focus rests on processing marketing plans, balancing orders, on records of market supplies, shipping and invoicing. The area of statistics and accounting is incorporated in the second stage of the subsystem development, including augmenting the other groups of tasks by further tasks.

4.7 Economic Information (EKI)

The subsystem "Economic Information" is based on the existing subsystem "Accounting" which forms part of the MARS ASRP prototype. It covers the problem complex of automation in the area of accounting which has an especially important role within the framework of the system of information. The overall orientation is also emphasized by this specification of individual groups of tasks:

- Analytical record of accounts receivable,
- Supplies en route,
- Ledger account,
- Post-calculation,
- Statistics of total indicators.

With the exception of the last named group of tasks this breakdown is fully covered in the structure of the "Accounting" subsystem in the MARS system. It is also based on the fact that experiences so far in routine applications and by users of this subsystem have been unusually positive.

4.8 Management of Fixed Assets (ZAP)

The ZAP subsystem takes up not only economic but also technical aspects of this indisputably very important element of enterprise property. In addition

to fixed assets it also deals with materials of gradual consumption (PPS). The overall handling of problems in this area anticipates these groups of tasks:

- Record of fixed assets (including PPS) and related processing,
- Planning comprehensive care for fixed assets and the normative base,
- Records and management of repairs,
- Utilization and renewal of basic asset resources.

With the exception of the last group of tasks it is expected that the major part of the other groups of tasks will be taken care of mostly in the course of the first stage of production of this subsystem. As opposed to the MARS ASRP prototype, this subsystem admits of considerable expansion (in the MARS system the processing was concentrated in the area of records of fixed assets and PPS and related processing).

4.9 Technical-Economic Planning (TEP)

This subsystem must meet an important objective in the area of enterprise management on the highest level by insuring all necessary data. Consequently, its orientation is concentrated on these groups of tasks:

- Mid-term planning,
- Annual and quarterly technical-economic plan and budget,
- Formulation of current calculations,
- Record and evaluation of the plan.

In the first stage of production of the subsystem main attention is focused on the area of the annual and quarterly technical-economic plan (creation of the total plan of production), on budgets of expenditures and of centers of income as well as formulation of current calculations. The group of tasks for mid-term planning in particular falls into the second stage.

4.10 Consideration of Future Developments

In addition to elaborating the processing of subsystems in the first stage the second stage of the VARS system development will be enriched with additional subsystems, including in particular:

- Management of the computer center (RVS) - with respect to requirements of the EC 1021 computer this problem was already taken care of within the framework of the MARS ASRP prototype,
- Quality management (JAK),
- Energy management (ENE),
- Management of technological development (TER),
- Management of capital construction (INV),
- Management of enterprise transportation (DOP),
- Shop management of production (DRV) - which, after withdrawal from the framework of the ORV subsystem will form an independent subsystem,
- Construction of the ASRSC which will hierarchically be linked on the ASRP level.

All the auxiliary setup previously mentioned in connection with the MARS system will also be available within the framework of the VARS system (see point 2.11).

4.11 Data bank system for the EC 1025 (DBS) (DBS/25-DL/1)

Analagous to the MARS ASRP prototype; within the framework of the VARS system a very important role will devolve on the data bank system for the EC 1025 computer - "DBS/25." At the same time it must be emphasized that in addition to the collective central data base of the VARS system local data banks for individual subsystems will also be specifically produced as needed. Their purpose will be to work the collections of local significance the maintenance and manipulation of which within the framework of the central data base would not only be of little operational use but would be time-consuming and uneconomical as well. This approach is based on results of analysis of the overall situation.

5. Closing Observations

The MARS ASRP prototype and the VARS system represent the results of a plan for users of productive computer technology, represented by the Czechoslovak computers of the JSEP series - EC 1021 and EC 1025 - to have available an effective device which would facilitate their rapid and efficient use. This device must be viewed in all its complexity since it involves not only programs but also a broadly based support setup which was briefly described in point 2.11.

One must also not underestimate the fact that users of the EC 1021 computers who will be utilizing the MARS ASRP prototype already are assured of future prospects for transition to the higher model EC 1025 of the JSEP-2 series which will have the VARS system available. In addition, there is great advantage in the fact that unity of the design staffs was maintained assuring production of both the subsystems mentioned. This offers the guarantee of smooth transition from the EC 1021 computer to the EC 1025 also in the area of program security.

With all these positive circumstances it must not be forgotten that success is impossible without the active involvement of the workers of users who plan to introduce these systems in their daily work. This is confirmed by experience and the very good results in dozens of organizations and enterprises which have already proceeded to gradually introduce the MARS ASRP prototype on the basis of its individual subsystems.

Legend for diagram on p 331 -
Title - "Orientation plan for MARS and VARS systems"
Etapa = stage
Inovace = Updating
The other symbols are expanded in the text.

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